

WHAT IS CLAIMED IS:

1. An image bearing member unit comprising:
an image bearing member on which a toner image is formed; and
a support member supporting the image bearing member such that the image
5 bearing member protrudes through an opening formed in the support member,
wherein the image bearing member unit is configured to be drawn out of and
put into a main body of an image forming apparatus, and
wherein the image bearing member unit further comprises a shutter assembled
with the support member to move in directions, substantially perpendicular to
10 directions in which the image bearing member unit is drawn out of and put into the
main body of the image forming apparatus, to be located, when the image bearing
member unit has been drawn out of the main body of the image forming apparatus, in
a closed position wherein the shutter covers the image bearing member protruding
through the opening formed in the support member, and to be located, when the image
15 bearing member unit has been set in a predetermined position inside of the main body
of the image forming apparatus, in an opened position wherein the shutter does not
cover the image bearing member protruding through the opening formed in the
support member.
2. The image bearing member unit according to Claim 1,
20 wherein the support member includes a guide part to guide the shutter to move
in the directions substantially perpendicular to the directions in which the image
bearing member unit is drawn out of and put into the main body of the image forming
apparatus.
3. The image bearing member unit according to Claim 1,

wherein the shutter moves to the closed position and to the opened position in conjunction with operations of attaching and detaching the image bearing member unit to and from the main body of the image forming apparatus.

4. The image bearing member unit according to Claim 1, further
5 comprising:

a guide member assembled with the support member to move in directions substantially parallel to the directions in which the image bearing member unit is drawn out of and put into the main body of the image forming apparatus,

wherein a guide protrusion part is provided to the shutter to protrude and a
10 guide slot is formed in the guide member, and the guide protrusion part provided to the shutter is slidably engaged with the guide slot formed in the guide member such that the shutter moves to the closed position or the opened position by relative movement of the guide member relative to the support member in the directions substantially parallel to the directions in which the image bearing member unit is
15 drawn out of and put into the main body of the image forming apparatus.

5. The image bearing member unit according to Claim 4,
wherein the guide slot extends in a direction slanted relative to the directions in which the image bearing member unit is drawn out of and put into the main body of the image forming apparatus.

20 6. The image bearing member unit according to Claim 4,
wherein plural pieces of the guide protrusion part are provided to the shutter and plural pieces of the guide slot are formed in the guide member, and the plural pieces of the guide protrusion part provided to the shutter are slidably engaged with the plural pieces of the guide slot formed in the guide member, respectively.

25 7. The image bearing member unit according to Claim 5,

wherein parts of the guide slot where the guide protrusion part is engaged with the guide slot when the shutter is in the closed position and the opened position, respectively, and respective neighboring parts thereof extend in a direction substantially parallel to the directions in which the image bearing member unit is
5 drawn out of and put into the main body of the image forming apparatus.

8. The image bearing member unit according to Claim 4,
wherein an engaging part is provided to the guide member to stop the guide member relative to the main body of the image forming apparatus in cooperation with a counterpart engaging part located inside of the main body of the image forming
10 apparatus when the image bearing member unit is drawn out of and put into the main body of the image forming apparatus, and

wherein the shutter is moved to the closed position or the opened position by stopping the guide member relative to the main body of the image forming apparatus with a cooperative operation of the engaging part provided to the guide member and
15 the counterpart engaging part located inside of the main body of the image forming apparatus and by moving the support member, the image bearing member unit and the shutter in the directions in which the image bearing member unit is drawn out of and put into the main body of the image forming apparatus.

9. The image bearing member unit according to Claim 8,
20 wherein the guide member is stopped relative to the main body of the image forming apparatus by holding the engaging part to the counterpart engaging part with a magnetic force.

10. The image bearing member unit according to Claim 4,

wherein a pressing member is provided to press the guide member in a direction substantially parallel to a direction in which the image bearing member unit is pushed to be put into the main body of the image forming apparatus, and

wherein when the image bearing member unit has been taken out of the main
5 body of the image forming apparatus, by an operation of the pressing member, the guide member is pressed to a most backside position relative to the support member in the direction in which the image bearing member unit is pushed to be put into the main body of the image forming apparatus, so that the shutter is held in the closed position, and when the image bearing member unit is pushed to be put into the main
10 body of the image forming apparatus, by a stopper provided at the side of the main body of the image forming apparatus, the guide member is stopped relative to the main body while resisting against the operation of the pressing member, so that the shutter is moved to the opened position.

11. The image bearing member unit according to Claim 1, further
15 comprising:

at least one wire spring fixed to the support member at one end thereof and contacting the support member at the other end thereof to slide in directions substantially parallel to the directions in which the image bearing member unit is drawn out and put into the main body of the image forming apparatus; and

20 a slider slidably holding the at least one wire spring and assembled with the support member to slide in directions substantially parallel to the directions in which the image bearing member unit is drawn out and put into the main body of the image forming apparatus,

wherein a middle part of the at least one wire spring between the one end and
25 the other end thereof is fixed to the shutter, and the middle part of the at least one wire

spring fixed to the shutter protrudes from a position of the one end and the other end of the at least one wire spring in a direction in which the shutter moves when the shutter moves to the closed position, and

wherein a positional relation among the slider, the at least one wire spring and the shutter is set such that the slider slides relative to the at least one wire spring in the directions substantially parallel to the directions in which the image bearing member unit is drawn out and put into the main body of the image forming apparatus to deform the at least one wire spring and thereby the shutter is moved to the closed position or the opened position.

12. The image bearing member unit according to Claim 11,
wherein the slider is configured to stop relative to the main body of the image forming apparatus when the image bearing member unit is drawn out of and put into the main body of the image forming apparatus by a cooperative operation with a counterpart engaging part located inside of the main body of the image forming apparatus, and

wherein the shutter is moved to the closed position or the opened position by stopping the slider relative to the main body of the image forming apparatus and by moving the support member, the shutter, and the at least one wire spring in the directions in which the image bearing member unit is drawn out of and put into the main body of the image forming apparatus to deform the at least one wire spring.

13. The image bearing member unit according to Claim 12,
wherein the slider is stopped relative to the main body of the image forming apparatus by holding the slider relative to the counterpart engaging part by a magnetic force.

14. The image bearing member unit according to Claim 11,

wherein the slider is slidably assembled with a part of the at least one wire spring between the one end thereof fixed to the support member and the middle part thereof fixed to the shutter.

15. The image bearing member unit according to Claim 11,
5 wherein the part of the at least one wire spring with which the slider is slidably assembled is curved to protrude in the direction in which the shutter moves to the opened position.

16. The image bearing member unit according to Claim 11,
wherein a guide part of the slider holding the at least one wire spring extends
10 in a direction substantially parallel to the directions in which the slider slides.

17. The image bearing member unit according to Claim 1, further comprising:

a regulating device to regulate a position of a part of the shutter opposing the image bearing member when the shutter is located in the closed position such that
15 when the shutter is located in the closed position the part of the shutter opposing the image bearing member does not contact an image forming area surface of the image bearing member.

18. The image bearing member unit according to Claim 17,
wherein the regulating device includes a flange of the image bearing member,
20 protruding toward the outside from a position of the image forming area surface of the image bearing member.

19. The image bearing member unit according to Claim 17,
wherein the regulating device includes a regulating protrusion formed in the support member.

25 20. The image bearing member unit according to Claim 17,

wherein the regulating device includes a regulating protrusion part formed in the shutter to contact a part of the image bearing member other than the image forming area surface thereof.

21. The image bearing member unit according to Claim 1,
5 wherein a part of the shutter, opposing the image forming area surface of the image bearing member when the image bearing member unit is in the closed position, is formed in a shape curved substantially along the image forming area surface of the image bearing member.

22. The image bearing member unit according to Claim 1,
10 wherein a part of the shutter, opposing the image forming area surface of the image bearing member when the image bearing member unit is in the closed position, is bent at a bending part thereof provided along an axial line of the image bearing member.

23. The image bearing member unit according to Claim 1,
15 wherein a receiving part is provided to the support member to engage with a tip end part of the shutter when the shutter is in the closed position, so that a gap is prevented from being formed between the tip end of the shutter and an edge of the support member at the side of the opening formed in the support member.

24. The image bearing member unit according to Claim 1,
20 wherein the shutter is arranged such that when the shutter is in the closed position, a flash formed at an edge part of the shutter when the shutter has been molded is located at a side separated from a surface of the image bearing member.

25. The image bearing member unit according to Claim 1,
wherein a tip end part corner of the shutter, opposing a surface of the image
25 bearing member when the shutter is in the closed position, is formed in a round shape.

26. The image bearing member unit according to Claim 1,
wherein at least a surface of the shutter, opposing the image bearing member,
is conductive.

27. The image bearing member unit according to Claim 1,
5 wherein the shutter and the support member are made of a same material.

28. A process cartridge comprising:
an image bearing member unit including an image bearing
member and a support member supporting the image bearing member such
that the image bearing member protrudes through an opening formed in the support
10 member; and
at least one process device configured to form a toner image on the image
bearing member of the image bearing member unit,
wherein the image bearing member unit is configured to be drawn out of and
put into a main body of an image forming apparatus, and
15 wherein the image bearing member unit further includes a shutter assembled
with the support member to move in directions, substantially perpendicular to
directions in which the image bearing member unit is drawn out of and put into the
main body of the image forming apparatus, to be located, when the image bearing
member unit has been drawn out of the main body of the image forming apparatus, in
20 a closed position wherein the shutter covers the image bearing member protruding
through the opening formed in the support member, and to be located, when the image
bearing member unit has been set in a predetermined position inside of the main body
of the image forming apparatus, in an opened position wherein the shutter does not
cover the image bearing member protruding through the opening formed in the
25 support member.

29. The process cartridge according to Claim 28,
wherein the support member of the image bearing member unit includes a
guide part to guide the shutter to move in the directions substantially perpendicular to
the directions in which the image bearing member unit is drawn out of and put into
5 the main body of the image forming apparatus.

30. The process cartridge according to Claim 28,
wherein the shutter of the image bearing member unit moves to the closed
position and to the opened position in conjunction with operations of attaching and
detaching the image bearing member unit to and from the main body of the image
10 forming apparatus.

31. The process cartridge according to Claim 28,
wherein the image bearing member unit further includes
a guide member assembled with the support member to move in directions
substantially parallel to the directions in which the image bearing member unit is
15 drawn out of and put into the main body of the image forming apparatus,
wherein a guide protrusion part is provided to the shutter to protrude and a
guide slot is formed in the guide member, and the guide protrusion part provided to
the shutter is slidably engaged with the guide slot formed in the guide member such
that the shutter moves to the closed position or the opened position by relative
20 movement of the guide member relative to the support member in the directions
substantially parallel to the directions in which the image bearing member unit is
drawn out of and put into the main body of the image forming apparatus.

32. The process cartridge according to Claim 31,

wherein the guide slot formed in the guide member extends in a direction slanted relative to the directions in which the image bearing member unit is drawn out of and put into the main body of the image forming apparatus.

33. The process cartridge according to Claim 31,

5 wherein plural pieces of the guide protrusion part are provided to the shutter and plural pieces of the guide slot are formed in the guide member, and the plural pieces of the guide protrusion part provided to the shutter are slidably engaged with the plural pieces of the guide slot formed in the guide member, respectively.

34. The process cartridge according to Claim 32,

10 wherein parts of the guide slot formed in the guide member, where the guide protrusion part provided to the shutter is engaged with the guide slot when the shutter is in the closed position and the opened position, respectively, and respective neighboring parts thereof extend in a direction substantially parallel to the directions in which the image bearing member unit is drawn out of and put into the main body of
15 the image forming apparatus.

35. The process cartridge according to Claim 31,

wherein an engaging part is provided to the guide member to stop the guide member relative to the main body of the image forming apparatus in cooperation with a counterpart engaging part located inside of the main body of the image forming
20 apparatus when the image bearing member unit is drawn out of and put into the main body of the image forming apparatus, and the shutter is moved to the closed position or the opened position by stopping the guide member relative to the main body of the image forming apparatus with a cooperative operation of the engaging part provided to the guide member and the counterpart engaging part located inside of the main
25 body of the image forming apparatus and by moving the support member, the image

bearing member unit and the shutter in the directions in which the image bearing member unit is drawn out of and put into the main body of the image forming apparatus.

36. The process cartridge according to Claim 35,

5 wherein the guide member is stopped relative to the main body of the image forming apparatus by holding the engaging part to the counterpart engaging part with a magnetic force.

37. The process cartridge according to Claim 31

wherein a pressing member is provided to press the guide member in a
10 direction substantially parallel to a direction in which the image bearing member unit is pushed to be put into the main body of the image forming apparatus, and when the image bearing member unit has been taken out of the main body of the image forming apparatus, by an operation of the pressing member, the guide member is pressed to a
15 most backside position relative to the support member in the direction in which the image bearing member unit is pushed to be put into the main body of the image forming apparatus, so that the shutter is held in the closed position, and when the image bearing member unit is pushed to be put into the main body of the image forming apparatus, by a stopper provided at the side of the main body of the image forming apparatus, the guide member is stopped relative to the main body while
20 resisting against the operation of the pressing member, so that the shutter is moved to the opened position.

38. The process cartridge according to Claim 28,

wherein the image bearing member unit further includes at least one wire spring fixed to the support member at one end thereof and contacting the support
25 member at the other end thereof to slide in directions substantially parallel to the

directions in which the image bearing member unit is drawn out and put into the main body of the image forming apparatus, and

5 a slider slidably holding the at least one wire spring and assembled with the support member to slide in directions substantially parallel to the directions in which the image bearing member unit is drawn out and put into the main body of the image forming apparatus, and

wherein a middle part of the at least one wire spring between the one end and the other end thereof is fixed to the shutter, the middle part of the at least one wire spring fixed to the shutter protrudes from positions of the one end and the other end of the at least one wire spring in a direction in which the shutter moves when the shutter moves to the closed position, and a positional relation among the slider, the at least one wire spring and the shutter is set such that the slider slides relative to the at least one wire spring in the directions substantially parallel to the directions in which the image bearing member unit is drawn out and put into the main body of the image forming apparatus to deform the at least one wire spring and thereby the shutter is moved to the closed position or the opened position.

39. The process cartridge according to Claim 38,

wherein the slider of the image bearing member unit is configured to stop relative to the main body of the image forming apparatus when the image bearing member unit is drawn out of and put into the main body of the image forming apparatus by a cooperative operation with a counterpart engaging part located inside of the main body of the image forming apparatus, and

wherein the shutter is moved to the closed position or the opened position by stopping the slider relative to the main body of the image forming apparatus and by moving the support member, the shutter, and the at least one wire spring in the

directions in which the image bearing member unit is drawn out of and put into the main body of the image forming apparatus to deform the at least one wire spring.

40. The process cartridge according to Claim 39,
wherein the slider is stopped relative to the main body of the image forming
5 apparatus by holding the slider relative to the counterpart engaging part by a magnetic force.

41. The process cartridge according to Claim 38,
wherein the slider is slidably assembled with a part of the at least one wire
spring between the one end thereof fixed to the support member and the middle part
10 thereof fixed to the shutter.

42. The process cartridge according to Claim 38,
wherein the part of the at least one wire spring with which the slider is slidably
assembled is curved to protrude in the direction in which the shutter moves to the
opened position.

15 43. The process cartridge according to Claim 38,
wherein a guide part of the slider holding the at least one wire spring extends
in a direction substantially parallel to the directions in which the slider slides.

44. The process cartridge according to Claim 28,
wherein the image bearing member unit further includes a regulating device to
20 regulate a position of a part of the shutter opposing the image bearing member when
the shutter is located in the closed position such that when the shutter is located in the
closed position the part of the shutter opposing the image bearing member does not
contact an image forming area surface of the image bearing member.

45. The process cartridge according to Claim 44,

wherein the regulating device of the image bearing member unit includes a flange of the image bearing member, protruding toward the outside from a position of the image forming area surface of the image bearing member.

46. The process cartridge according to Claim 44,
5 wherein the regulating device of the image bearing member unit includes a regulating protrusion formed in the support member.

47. The process cartridge according to Claim 44,
wherein the regulating device of the image bearing member unit includes a regulating protrusion part formed in the shutter to contact a part of the image bearing
10 member other than the image forming area surface thereof.

48. The process cartridge according to Claim 28,
wherein a part of the shutter, opposing the image forming area surface of the image bearing member when the image bearing member unit is in the closed position, is formed in a shape curved substantially along the image forming area surface of the
15 image bearing member.

49. The process cartridge according to Claim 28,
wherein a part of the shutter, opposing the image forming area surface of the image bearing member when the image bearing member unit is in the closed position, is bent at a bending part thereof provided along an axial line of the image bearing
20 member.

50. The process cartridge according to Claim 28,
wherein a receiving part is provided to the support member to engage with a tip end part of the shutter when the shutter is in the closed position, so that a gap is prevented from being formed between the tip end of the shutter and an edge of the
25 support member at the side of the opening formed in the support member.

51. The process cartridge according to Claim 28,

wherein the shutter is arranged such that when the shutter is in the closed position, a flash formed at an edge part of the shutter when the shutter has been molded is located at a side separated from a surface of the image bearing member.

5 52. The process cartridge according to Claim 28,

wherein a tip end part corner of the shutter, opposing a surface of the image bearing member when the shutter is in the closed position, is formed in a round shape.

53. The process cartridge according to Claim 28,

wherein at least a surface of the shutter, opposing the image bearing member,
10 is conductive.

54. The process cartridge according to Claim 28,

wherein the shutter and the support member are made of a same material.

55. The process cartridge according to Claim 28,

wherein the image bearing member unit is detachable relative to a part of the
15 process cartridge.

56. An image forming apparatus comprising:

a main body;

an image bearing member unit including an image bearing

member and a support member supporting the image bearing member such

20 that the image bearing member protrudes through an opening formed in the support member; and

at least one process device configured to form a toner image on the image bearing member of the image bearing member unit,

wherein the image bearing member unit is configured to be drawn out of and
25 put into the main body, and

wherein the image bearing member unit further includes a shutter assembled with the support member to move in directions, substantially perpendicular to directions in which the image bearing member unit is drawn out of and put into the main body, to be located, when the image bearing member unit has been drawn out of the main body, in a closed position wherein the shutter covers the image bearing member protruding through the opening formed in the support member, and to be located, when the image bearing member unit has been set in a predetermined position inside of the main body, in an opened position wherein the shutter does not cover the image bearing member protruding through the opening formed in the support member.

57. The image forming apparatus according to Claim 56,
wherein the support member of the image bearing member unit includes a guide part to guide the shutter to move in the directions substantially perpendicular to the directions in which the image bearing member unit is drawn out of and put into the main body.

58. The image forming apparatus according to Claim 56,
wherein the shutter of the image bearing member unit moves to the closed position and to the opened position in conjunction with operations of attaching and detaching the image bearing member unit to and from the main body.

59. The image forming apparatus according to Claim 56,
wherein the image bearing member unit further includes
a guide member assembled with the support member to move in directions substantially parallel to the directions in which the image bearing member unit is drawn out of and put into the main body,

wherein a guide protrusion part is provided to the shutter to protrude and a guide slot is formed in the guide member, and the guide protrusion part provided to the shutter is slidably engaged with the guide slot formed in the guide member such that the shutter moves to the closed position or the opened position by relative
5 movement of the guide member relative to the support member in the directions substantially parallel to the directions in which the image bearing member unit is drawn out of and put into the main body.

60. The image forming apparatus according to Claim 59,
wherein the guide slot formed in the guide member extends in a direction
10 slanted relative to the directions in which the image bearing member unit is drawn out of and put into the main body.

61. The image forming apparatus according to Claim 59,
wherein plural pieces of the guide protrusion part are provided to the shutter and plural pieces of the guide slot are formed in the guide member, and the plural
15 pieces of the guide protrusion part provided to the shutter are slidably engaged with the plural pieces of the guide slot formed in the guide member, respectively.

62. The image forming apparatus according to Claim 60,
wherein parts of the guide slot formed in the guide member, where the guide protrusion part provided to the shutter is engaged with the guide slot when the shutter
20 is in the closed position and the opened position, respectively, and respective neighboring parts thereof extend in a direction substantially parallel to the directions in which the image bearing member unit is drawn out of and put into the main body.

63. The image forming apparatus according to Claim 59,
wherein an engaging part is provided to the guide member to stop the guide
25 member relative to the main body in cooperation with a counterpart engaging part

located inside of the main body when the image bearing member unit is drawn out of and put into the main body, and the shutter is moved to the closed position or the opened position by stopping the guide member relative to the main body with a cooperative operation of the engaging part provided to the guide member and the counterpart engaging part located inside of the main body and by moving the support member, the image bearing member unit and the shutter in the directions in which the image bearing member unit is drawn out of and put into the main body.

64. The image forming apparatus according to Claim 63,
wherein the guide member is stopped relative to the main body by holding the engaging part to the counterpart engaging part with a magnetic force.

65. The image forming apparatus according to Claim 59,
wherein a pressing member is provided to press the guide member in a direction substantially parallel to a direction in which the image bearing member unit is pushed to be put into the main body, and when the image bearing member unit has been taken out of the main body, by an operation of the pressing member, the guide member is pressed to a most backside position relative to the support member in the direction in which the image bearing member unit is pushed to be put into the main body, so that the shutter is held in the closed position, and when the image bearing member unit is pushed to be put into the main body, by a stopper provided at the side of the main body, the guide member is stopped relative to the main body while resisting against the operation of the pressing member, so that the shutter is moved to the opened position.

66. The image forming apparatus according to Claim 56,
wherein the image bearing member unit further includes at least one wire spring fixed to the support member at one end thereof and contacting the support

member at the other end thereof to slide in directions substantially parallel to the directions in which the image bearing member unit is drawn out and put into the main body, and a slider slidably holding the at least one wire spring and assembled with the support member to slide in directions substantially parallel to the directions in which the image bearing member unit is drawn out and put into the main body, and

5 wherein a middle part of the at least one wire spring between the one end and the other end thereof is fixed to the shutter, the middle part of the at least one wire spring fixed to the shutter protrudes from positions of the one end and the other end of the at least one wire spring in a direction in which the shutter moves when the shutter moves to the closed position, and a positional relation among the slider, the at least

10 one wire spring and the shutter is set such that the slider slides relative to the at least one wire spring in the directions substantially parallel to the directions in which the image bearing member unit is drawn out and put into the main body to deform the at least one wire spring and thereby the shutter is moved to the closed position or the

15 opened position.

67. The image forming apparatus according to Claim 66,

wherein the slider of the image bearing member unit is configured to stop relative to the main body when the image bearing member unit is drawn out of and put into the main body by a cooperative operation with a counterpart engaging part

20 located inside of the main body, and

wherein the shutter is moved to the closed position or the opened position by stopping the slider relative to the main body and by moving the support member, the shutter, and the at least one wire spring in the directions in which the image bearing member unit is drawn out of and put into the main body to deform the at least one

25 wire spring.

68. The image forming apparatus according to Claim 67,
wherein the slider is stopped relative to the main body by holding the slider
relative to the counterpart engaging part by a magnetic force.

69. The image forming apparatus according to Claim 66,
5 wherein the slider is slidably assembled with a part of the at least one wire
spring between the one end thereof fixed to the support member and the middle part
thereof fixed to the shutter.

70. The image forming apparatus according to Claim 66,
wherein the part of the at least one wire spring with which the slider is slidably
10 assembled is curved to protrude in the direction in which the shutter moves to the
opened position.

71. The image forming apparatus according to Claim 66,
wherein a guide part of the slider holding the at least one wire spring extends
in a direction substantially parallel to the directions in which the slider slides.

72. The image forming apparatus according to Claim 56,
15 wherein the image bearing member unit further includes a regulating device to
regulate a position of a part of the shutter opposing the image bearing member when
the shutter is located in the closed position such that when the shutter is located in the
closed position the part of the shutter opposing the image bearing member does not
20 contact an image forming area surface of the image bearing member.

73. The image forming apparatus according to Claim 72,
wherein the regulating device of the image bearing member unit includes a
flange of the image bearing member, protruding toward the outside from a position of
the image forming area surface of the image bearing member.

74. The image forming apparatus according to Claim 72,

wherein the regulating device of the image bearing member unit includes a regulating protrusion formed in the support member.

75. The image forming apparatus according to Claim 72,
wherein the regulating device of the image bearing member unit includes a
5 regulating protrusion part formed in the shutter to contact a part of the image bearing member other than the image forming area surface thereof.

76. The image forming apparatus according to Claim 56,
wherein a part of the shutter, opposing the image forming area surface of the image bearing member when the image bearing member unit is in the closed position,
10 is formed in a shape curved substantially along the image forming area surface of the image bearing member.

77. The image forming apparatus according to Claim 56,
wherein a part of the shutter, opposing the image forming area surface of the image bearing member when the image bearing member unit is in the closed position,
15 is bent at a bending part thereof provided along an axial line of the image bearing member.

78. The image forming apparatus according to Claim 56,
wherein a receiving part is provided to the support member to engage with a tip end part of the shutter when the shutter is in the closed position, so that a gap is
20 prevented from being formed between the tip end of the shutter and an edge of the support member at the side of the opening formed in the support member.

79. The image forming apparatus according to Claim 56,
wherein the shutter is arranged such that when the shutter is in the closed position, a flash formed at an edge part of the shutter when the shutter has been
25 molded is located at a side separated from a surface of the image bearing member.

80. The image forming apparatus according to Claim 56,
wherein a tip end part corner of the shutter, opposing a surface of the image
bearing member when the shutter is in the closed position, is formed in a round shape.
81. The image forming apparatus according to Claim 56,
5 wherein at least a surface of the shutter, opposing the image bearing member,
is conductive.
82. The image forming apparatus according to Claim 56,
wherein the shutter and the support member are made of a same material.
83. The image forming apparatus according to Claim 56,
10 wherein the image bearing member unit and the at least one process device are
assembled with each other to form a process cartridge.
84. The image forming apparatus according to Claim 83,
wherein the image bearing member unit is detachable relative to a part of the
process cartridge.
85. The image forming apparatus according to Claim 56,
15 further comprising:
a detect device configured to detect if the shutter remains in the closed
position when the image bearing member unit has been set in the predetermined
position inside of the main body.
86. An image bearing member unit comprising:
20 an image bearing member on which a toner image is formed;
a support member supporting the image bearing member such that the image
bearing member protrudes through an opening formed in the support member;
a shutter assembled with the support member to move between an opened
25 position wherein the shutter does not cover the image bearing member protruding

through the opening formed in the support member and a closed position wherein the shutter covers the image bearing member protruding through the opening formed in the support member;

a pressing member pressing the shutter toward the closed position; and

5 a shutter opening/closing regulation device connected with the shutter and the support member to be located, when the shutter is in the closed position, in a first position wherein the shutter opening/closing regulation device protrudes upward, and to be located, when the shutter is in the closed position, in a second position wherein a height of the shutter opening/closing regulation device is lower than that when the shutter opening/closing regulation device is located in the first position,

10 wherein the image bearing member unit is configured to be drawn out and put into a main body of an image forming apparatus, and

wherein, after the image bearing member unit in a state that the shutter is located in the closed position has been placed inside of the main body of the image forming apparatus, by moving the image bearing member unit upward relative to a member of the main body other than the image bearing member unit, the shutter opening/closing regulation device is pressed by the member of the main body other than the image bearing member unit downward to be located in the second position, and thereby the shutter is operated to move to the opened position.

20 87. The image bearing member unit according to Claim 86,

wherein the shutter opening/closing regulation device includes a plurality of arms rotatably connected with each other, and

wherein a first arm of the plurality of arms is rotatably connected with the support member, a second arm of the plurality of arms is rotatably connected with the

shutter, and the shutter is slidably assembled with the support member to move between the opened and closed positions.

88. The image bearing member unit according to Claim 87,
wherein the plurality of arms include at least four arms.

5 89. The image bearing member unit according to Claim 87,
wherein a number of the plurality of arms of the shutter opening/closing regulation device and shapes of the plurality of arms of the shutter opening/closing regulation device are set such that the shutter opening/closing regulation device is in a symmetrical shape.

10 90. The image bearing member unit according to Claim 86,
wherein the pressing member includes a plurality of springs arranged in point or line symmetry.

91. The image bearing member unit according to Claim 86,
wherein the shutter opening/closing regulation device is configured to serve as
15 a handle of the image bearing member unit.

92. The image bearing member unit according to Claim 91,
wherein the image bearing member unit includes two units of the shutter opening/closing regulation device arranged in positions separated from each other,
and

20 wherein a vertical line passing a center of gravity of the image bearing member unit intersects with a line connecting substantially center parts of the two units of the shutter opening/closing regulation device.

93. The image bearing member unit according to Claim 91,
wherein the shutter opening/closing regulation device includes a plurality of
25 arms rotatably connected with each other, and

wherein a number of the plurality of arms is an odd number, and when the image bearing member unit is in a horizontal posture, an arm of the plurality of arms located in a center of the plurality of arms is put into a substantially horizontal posture.

5 94. The image bearing member unit according to Claim 91,
 wherein the shutter opening/closing regulation device is different from other parts of the image bearing member unit in color.

 95. The image bearing member unit according to Claim 91,
 wherein the shutter opening/closing regulation device includes a slip stopper.

10 96. A process cartridge comprising:
 an image bearing member unit including;
 an image bearing member,
 a support member supporting the image bearing member such that the image bearing member protrudes through an opening formed in the support member,

15 a shutter assembled with the support member to move between an opened position wherein the shutter does not cover the image bearing member protruding through the opening formed in the support member and a closed position wherein the shutter covers the image bearing member protruding through the opening formed in the support member,

20 a pressing member pressing the shutter toward the closed position, and
 a shutter opening/closing regulation device connected with the shutter and the support member to be located, when the shutter is in the closed position, in a first position wherein the shutter opening/closing regulation device protrudes upward, and to be located, when the shutter is in the closed position, in a second position wherein a

height of the shutter opening/closing regulation device is lower than that when the shutter opening/closing regulation device is located in the first position; and

at least one process device for forming a toner image on the image bearing member of the image bearing member unit,

5 wherein the image bearing member unit is configured to be drawn out and put into a main body of an image forming apparatus, and

wherein, after the image bearing member unit in a state that the shutter is located in the closed position has been placed inside of the main body of the image forming apparatus, by moving the image bearing member unit upward relative to a member of the main body other than the image bearing member unit, the shutter opening/closing regulation device is pressed by the member of the main body other than the image bearing member unit downward to be located in the second position, and thereby the shutter is operated to move to the opened position.

97. The process cartridge according to Claim 96,
15 wherein the shutter opening/closing regulation device includes a plurality of arms rotatably connected with each other, and

wherein a first arm of the plurality of arms is rotatably connected with the support member, a second arm of the plurality of arms is rotatably connected with the shutter, and the shutter is slidably assembled with the support member to move
20 between the opened and closed positions.

98. The process cartridge according to Claim 97,
wherein the plurality of arms include at least four arms.

99. The process cartridge according to Claim 97,
wherein a number of the plurality of arms of the shutter opening/closing regulation device and shapes of the plurality of arms of the shutter opening/closing
25

regulation device are set such that the shutter opening/closing regulation device is in a symmetrical shape.

100. The process cartridge according to Claim 96,
wherein the pressing member includes a plurality of springs arranged in point
5 or line symmetry.

101. The process cartridge according to Claim 96,
wherein the shutter opening/closing regulation device is configured to serve as
a handle of the image bearing member unit.

102. The process cartridge according to Claim 101,
10 wherein the image bearing member unit includes two units of the shutter
opening/closing regulation device arranged in positions separated from each other,
and

wherein a vertical line passing a center of gravity of the image bearing
member unit intersects with a line connecting substantially center parts of the two
15 units of the shutter opening/closing regulation device.

103. The process cartridge according to Claim 101,
wherein the shutter opening/closing regulation device includes a plurality of
arms rotatably connected with each other, and
wherein a number of the plurality of arms is an odd number, and when the
20 image bearing member unit is in a horizontal posture, an arm of the plurality of arms
located in a center of the plurality of arms is put into a substantially horizontal
posture.

104. The process cartridge according to Claim 101,
wherein the shutter opening/closing regulation device is different from other
25 parts of the image bearing member unit in color.

105. The process cartridge according to Claim 101,
wherein the shutter opening/closing regulation device includes a slip stopper.

106. The process cartridge according to Claim 96,
wherein the image bearing member unit is detachable relative to a part of the

5 process cartridge.

107. An image forming apparatus comprising:

a main body;

an image bearing member unit including,

an image bearing member,

10 a support member supporting the image bearing member such that the image
bearing member protrudes through an opening formed in the support member,

a shutter assembled with the support member to move between an opened
position wherein the shutter does not cover the image bearing member protruding
through the opening formed in the support member and a closed position wherein the
15 shutter covers the image bearing member protruding through the opening formed in
the support member,

a pressing member pressing the shutter toward the closed position, and

a shutter opening/closing regulation device connected with the shutter and the
support member to be located, when the shutter is in the closed position, in a first
20 position wherein the shutter opening/closing regulation device protrudes upward, and
to be located, when the shutter is in the closed position, in a second position wherein a
height of the shutter opening/closing regulation device is lower than that when the
shutter opening/closing regulation device is located in the first position; and

at least one process device configured to form a toner image on the image
25 bearing member of the image bearing member unit,

wherein the image bearing member unit is configured to be drawn out and put into the main body, and

wherein, after the image bearing member unit in a state that the shutter is located in the closed position has been placed inside of the main body, by moving the image bearing member unit upward relative to a member of the main body other than the image bearing member unit, the shutter opening/closing regulation device is pressed by the member of the main body other than the image bearing member unit downward to be located in the second position, and thereby the shutter is operated to move to the opened position.

10 108. The image forming apparatus according to Claim 107,
 wherein the shutter opening/closing regulation device includes a plurality of arms rotatably connected with each other, and

 wherein a first arm of the plurality of arms is rotatably connected with the support member, a second arm of the plurality of arms is rotatably connected with the shutter, and the shutter is slidably assembled with the support member to move between the opened and closed positions.

 109. The image forming apparatus according to Claim 108,
 wherein the plurality of arms include at least four arms.

20 110. The image forming apparatus according to Claim 108,
 wherein a number of the plurality of arms of the shutter opening/closing regulation device and shapes of the plurality of arms of the shutter opening/closing regulation device are set such that the shutter opening/closing regulation device is in a symmetrical shape.

 111. The image forming apparatus according to Claim 107,

wherein the pressing member includes a plurality of springs arranged in point or line symmetry.

112. The image forming apparatus according to Claim 107,
wherein the shutter opening/closing regulation device is configured to serve as
5 a handle of the image bearing member unit.

113. The image forming apparatus according to Claim 112,
wherein the image bearing member unit includes two units of the shutter
opening/closing regulation device arranged in positions separated from each other,
and
10 wherein a vertical line passing a center of gravity of the image bearing
member unit intersects with a line connecting substantially center parts of the two
units of the shutter opening/closing regulation device.

114. The image forming apparatus according to Claim 112,
wherein the shutter opening/closing regulation device includes a plurality of
15 arms rotatably connected with each other, and
wherein a number of the plurality of arms is an odd number, and when the
image bearing member unit is in a horizontal posture, an arm of the plurality of arms
located in a center of the plurality of arms is put into a substantially horizontal
posture.

20 115. The image forming apparatus according to Claim 112,
wherein the shutter opening/closing regulation device is different from other
parts of the image bearing member unit in color.

116. The image forming apparatus according to Claim 112,
wherein the shutter opening/closing regulation device includes a slip stopper.

25 117. The image forming apparatus according to Claim 107,

wherein the image bearing member unit and the at least one process device are assembled with each other to form a process cartridge.

118. The image forming apparatus according to Claim 117,
wherein the image bearing member unit is detachable relative to a part of the
5 process cartridge.

119. An image bearing member unit comprising:
an image bearing member on which a toner image is formed; and
means for supporting the image bearing member such that the image bearing
member protrudes through an opening formed in the supporting means,
10 wherein the image bearing member unit is configured to be drawn out of and
put into a main body of an image forming apparatus, and

wherein the image bearing member unit further comprises means for covering
and uncovering the image bearing member protruding through the opening formed in
the supporting means, the covering/uncovering means being assembled with the
15 supporting means to move in directions, substantially perpendicular to directions in
which the image bearing member unit is drawn out of and put into the main body of
the image forming apparatus, to be located, when the image bearing member unit has
been drawn out of the main body of the image forming apparatus, in a closed position
wherein the covering/uncovering means covers the image bearing member protruding
20 through the opening formed in the supporting means, and to be located, when the
image bearing member unit has been set in a predetermined position inside of the
main body of the image forming apparatus, in an opened position wherein the
covering/uncovering means does not cover the image bearing member protruding
through the opening formed in the supporting means.

25 120. A process cartridge comprising:

an image bearing member unit including an image bearing member and means for supporting the image bearing member such that the image bearing member protrudes through an opening formed in the supporting means; and

5 at least one means for forming a toner image on the image bearing member of the image bearing member unit,

 wherein the image bearing member unit is configured to be drawn out of and put into a main body of an image forming apparatus, and

 wherein the image bearing member unit further includes means for covering
10 and uncovering the image bearing member protruding through the opening formed in the supporting means, the covering/uncovering means being assembled with the supporting means to move in directions, substantially perpendicular to directions in which the image bearing member unit is drawn out of and put into the main body of the image forming apparatus, to be located, when the image bearing member unit has
15 been drawn out of the main body of the image forming apparatus, in a closed position wherein the covering/uncovering means covers the image bearing member protruding through the opening formed in the supporting means, and to be located, when the image bearing member unit has been set in a predetermined position inside of the main body of the image forming apparatus, in an opened position wherein the
20 covering/uncovering means does not cover the image bearing member protruding through the opening formed in the supporting means.

121. An image forming apparatus comprising:

a main body;

an image bearing member unit including an image bearing

member and supporting means for supporting the image bearing member such that the image bearing member protrudes through an opening formed in the supporting means; and

at least one means for forming a toner image on the image bearing member of
5 the image bearing member unit,

wherein the image bearing member unit is configured to be drawn out of and put into the main body, and

wherein the image bearing member unit further includes means for covering and uncovering the image bearing member protruding through the opening formed in
10 the supporting means, the covering/uncovering means being assembled with the supporting means to move in directions, substantially perpendicular to directions in which the image bearing member unit is drawn out of and put into the main body, to be located, when the image bearing member unit has been drawn out of the main body, in a closed position wherein the covering/uncovering means covers the image
15 bearing member protruding through the opening formed in the supporting means, and to be located, when the image bearing member unit has been set in a predetermined position inside of the main body, in an opened position wherein the covering/uncovering means does not cover the image bearing member protruding through the opening formed in the supporting means.

20 122. An image bearing member unit comprising:

an image bearing member on which a toner image is formed;

means for supporting the image bearing member such that the image bearing member protrudes through an opening formed in the supporting means;

means for covering and uncovering the image bearing member protruding
25 through the opening formed in the supporting means, the covering/uncovering means

being assembled with the supporting means to move between an opened position wherein the covering/uncovering means does not cover the image bearing member protruding through the opening formed in the supporting means and a closed position wherein the covering/uncovering means covers the image bearing member protruding through the opening formed in the supporting means;

5 means for pressing the covering/uncovering means toward the closed position;

and

means for regulating the covering/uncovering means connected with the covering/uncovering means and the supporting means to be located, when the covering/uncovering means is in the closed position, in a first position wherein the covering/uncovering means regulating means protrudes upward, and to be located,

10 when the covering/uncovering means is in the closed position, in a second position wherein a height of the covering/uncovering means regulating means is lower than that when the covering/uncovering means regulating means is located in the first position,

15 wherein the image bearing member unit is configured to be drawn out and put into a main body of an image forming apparatus, and

wherein, after the image bearing member unit in a state that the covering/uncovering means is located in the closed position has been placed inside of the main body of the image forming apparatus, by moving the image bearing member unit upward relative to a member of the main body other than the image bearing member unit, the covering/uncovering means regulating means is pressed by the member of the main body other than the image bearing member unit downward to be located in the second position, and thereby the covering/uncovering means is operated

20 to move to the opened position.

25

123. A process cartridge comprising:

an image bearing member unit including;

an image bearing member,

means for supporting the image bearing member such that the image bearing

5 member protrudes through an opening formed in the supporting means,

means for covering/uncovering the image bearing member protruding through

the opening formed in the supporting means, the covering/uncovering means being

assembled with the supporting means to move between an opened position wherein

the covering/uncovering means does not cover the image bearing member protruding

10 through the opening formed in the supporting means and a closed position wherein

the covering/uncovering means covers the image bearing member protruding through

the opening formed in the supporting means,

means for pressing the covering/uncovering means toward the closed position,

and

15 means for regulating the covering/uncovering means connected with the

covering/uncovering means and the supporting means to be located, when the

covering/uncovering means is in the closed position, in a first position wherein the

covering/uncovering means regulating means protrudes upward, and to be located,

when the covering/uncovering means is in the closed position, in a second position

20 wherein a height of the covering/uncovering means regulating means is lower than

that when the covering/uncovering means regulating means is located in the first

position; and

at least one means for forming a toner image on the image bearing member of
the image bearing member unit,

wherein the image bearing member unit is configured to be drawn out and put into a main body of an image forming apparatus, and

wherein, after the image bearing member unit in a state that the covering/uncovering means is located in the closed position has been placed inside of the main body of the image forming apparatus, by moving the image bearing member unit upward relative to a member of the main body other than the image bearing member unit, the covering/uncovering means regulating means is pressed by the member of the main body other than the image bearing member unit downward to be located in the second position, and thereby the covering/uncovering means is operated to move to the opened position.

124. An image forming apparatus comprising:

a main body;

an image bearing member unit including;

an image bearing member,

means for supporting the image bearing member such that the image bearing member protrudes through an opening formed in the supporting means,

means for covering/uncovering the image bearing member protruding through the opening formed in the supporting means, the covering/uncovering means being assembled with the supporting means to move between an opened position wherein the covering/uncovering means does not cover the image bearing member protruding through the opening formed in the supporting means and a closed position wherein the covering/uncovering means covers the image bearing member protruding through the opening formed in the supporting means,

means for pressing the covering/uncovering means toward the closed position, and

means for regulating the covering/uncovering means connected with the covering/uncovering means and the supporting means to be located, when the covering/uncovering means is in the closed position, in a first position wherein the covering/uncovering means regulating means protrudes upward, and to be located, 5 when the covering/uncovering means is in the closed position, in a second position wherein a height of the covering/uncovering means regulating means is lower than that when the covering/uncovering means regulating means is located in the first position; and

at least one means for forming a toner image on the image bearing member of 10 the image bearing member unit,

wherein the image bearing member unit is configured to be drawn out and put into a main body of an image forming apparatus, and

wherein, after the image bearing member unit in a state that the covering/uncovering means is located in the closed position has been placed inside of 15 the main body of the image forming apparatus, by moving the image bearing member unit upward relative to a member of the main body other than the image bearing member unit, the covering/uncovering means regulating means is pressed by the member of the main body other than the image bearing member unit downward to be located in the second position, and thereby the covering/uncovering means is operated 20 to move to the opened position.